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CLAIMS

1. Weldable component of structural steel, characterized in that its chemical composition comprises, by weight:

5 $0.10\% \leq C \leq 0.22\%$

$$0.50\% \leq Si \leq 1.50\%$$

$$Al \leq 0.9\%$$

$$0\% \leq Mn \leq 3\%$$

$$0\% \leq Ni \leq 5\%$$

10 $0\% \leq Cr \leq 4\%$

$$0\% \leq Cu \leq 1\%$$

$$0\% \leq Mo + W/2 \leq 1.5\%$$

$$0.0005\% \leq B \leq 0.010\%$$

$$N \leq 0.025\%$$

15 optionally at least one element selected from V, Nb, Ta, S and Ca, at contents of less than 0.3%, and/or from Ti and Zr at contents of less than or equal to 0.5%, the remainder being iron and impurities resulting from the production operation,

the contents of aluminium, boron, titanium and nitrogen, expressed in thousandths of %, of the composition also satisfying the following relationship:

20

$$B \geq \frac{1}{3} \times K + 0,5, \quad (1)$$

with $K = \text{Min}(I^* ; J^*)$

$$I^* = \text{Max}(0 ; I) \quad \text{and} \quad J^* = \text{Max}(0 ; J)$$

$$I = \text{Min}(N ; N - 0,29(Ti - 5))$$

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$$J = \text{Min} \left(N ; 0,5 \left(N - 0,52 Al + \sqrt{(N - 0,52 Al)^2 + 283} \right) \right),$$

the contents of silicon and aluminium of the composition also complying with the following conditions:

if $C > 0.145$, then $Si + Al < 0.95$

and whose structure is bainitic, martensitic or martensitic-bainitic and also comprises from 3 to 20% of residual austenite.

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2. Steel component according to claim 1, characterized in that its chemical composition also satisfies the following relationship:

$$1.1\% \text{Mn} + 0.7\% \text{Ni} + 0.6\% \text{Cr} + 1.5(\% \text{Mo} + \% \text{W}/2) \geq 1 \quad (2)$$

3. Steel component according to claim 2, characterized also in that its chemical composition satisfies the following relationship:

$$1.1\% \text{Mn} + 0.7\% \text{Ni} + 0.6\% \text{Cr} + 1.5(\% \text{Mo} + \% \text{W}/2) \geq 2 \quad (2)$$

4. Steel component according to any one of claims 1 to 3, characterized in that its chemical composition also satisfies the following relationship:

$$\% \text{Cr} + 3(\% \text{Mo} + \% \text{W}/2) \geq 1.8.$$

5. Steel component according to claim 4, characterized in that its chemical composition also satisfies the following relationship:

$$\% \text{Cr} + 3(\% \text{Mo} + \% \text{W}/2) \geq 2.0.$$

6. Method for manufacturing a weldable steel component according to any one of claims 1 to 5, characterized in that

- the component is austenitized by heating at a temperature of from A_{c3} to 1000°C , and it is then cooled to a temperature of less than or equal to 200°C , in such a manner that, at the core of the component, the rate of cooling between 800°C and 500°C is greater than or equal to the critical bainitic velocity,

- optionally, tempering is effected at a temperature of less than or equal to A_{c1} .

7. Method according to claim 6, characterized in that, at the core of the component, the cooling rate between 500°C and a temperature of less than or equal to 200°C is from 0.07°C/s to 5°C/s .

8. Method according to claim 6 or 7, characterized in that tempering is effected at a temperature of less than 300°C for a period of time of less than 10 hours, at the end of the cooling operation to a temperature of less than or equal to 200°C .

9. Method according to claim 6 or 7, characterized in that no tempering is carried out at the end of the cooling operation to a temperature of less than or equal to 200°C .

10. Method for manufacturing a weldable steel plate according to any one of claims 1 to 5, the thickness of which is from 3 mm to 150 mm,

characterized in that the plate is quenched, the cooling rate V_R at the core of the component between 800°C and 500°C and the composition of the steel being such that:

$$1.1\% \text{Mn} + 0.7\% \text{Ni} + 0.6\% \text{Cr} + 1.5(\% \text{Mo} + \% \text{W}/2) + \log V_R \geq 5.5.$$

- 5 11. Method for manufacturing a weldable steel plate according to claim 10, the thickness of which is from 3 mm to 150 mm, characterized, in addition, in that the plate is quenched, the cooling rate V_R at the core of the component between 800°C and 500°C and the composition of the steel being such that:

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$$1.1\% \text{Mn} + 0.7\% \text{Ni} + 0.6\% \text{Cr} + 1.5(\% \text{Mo} + \% \text{W}/2) + \log V_R \geq 6.$$